

5. $P = 20 \text{ MW}$ $\cos \varphi = 0,95$ $L = 10 \text{ km}$ $S_{AC} = 2,9 \cdot 10^{-8} \Omega \text{ km}$

a) $U = 10 \text{ kV}$ AL/\bar{c} $490/65 \text{ mm}^2$ $S_{m2}/S_c = 490,3/636$

$$R = \frac{S_{AL} L}{S_{AC}} = \frac{2,9 \cdot 10^{-8} \Omega \cdot \text{km} \cdot 10 \cdot 10^3 \text{ m}}{490,3 \text{ mm}^2} = \frac{2,9 \cdot 10^{-8} \cdot 10 \cdot 10^6 \Omega \cdot \text{km}}{490,3}$$

$$R = \frac{2,9 \cdot 10^{-2}}{490,3} = 59,18 \frac{290}{490,3} = 0,591 \Omega$$

$$\begin{aligned} S &= 2,9 \cdot 10^{-8} \Omega \text{ km} = 2,9 \cdot 10^{-8} \Omega \cdot 10^3 \text{ mm} \frac{(\text{km})}{\text{km}} = 2,9 \cdot 10^{-5} \frac{10^6 \Omega \text{ mm}}{\text{km}} \\ &= 29 \cdot 10 \frac{\Omega \text{ mm}^2}{\text{km}} \end{aligned}$$

$$R = \frac{S \cdot l}{S} = 29 \frac{\Omega \text{ mm}^2}{\text{km}} \cdot \frac{10 \text{ km}}{490,3 \text{ mm}^2} = 0,591 \Omega$$

a) $P = \sqrt{3} U I \cos \varphi \Rightarrow I = \frac{P}{\sqrt{3} U \cos \varphi} = \frac{20 \cdot 10^6}{\sqrt{3} \cdot 10 \cdot 10^3 \cdot 0,95} = 1216,9 \text{ A}$

$$\Delta P_{\pm} = R I^2 = 0,591 \cdot 1216,9^2 = 875201,5 \text{ W} = 0,8752 \text{ MW}$$

$$\Delta P_{\Sigma} = 3 \Delta P_1 = 2,6256 \text{ MW}$$

b) $U = 110 \text{ kV}$ AL/\bar{c} $120/20$ $S_{AC}/S_{cc} = 121,6/119,5$

$$R = \frac{S L}{S} = 29 \frac{\Omega \text{ mm}^2}{\text{km}} \cdot \frac{10 \text{ km}}{121,6 \text{ mm}^2} = 2,385 \Omega$$

$$P = \sqrt{3} U I \cos \varphi \Rightarrow I = \frac{P}{\sqrt{3} U \cos \varphi} = \frac{20 \cdot 10^6}{\sqrt{3} \cdot 110 \cdot 10^3 \cdot 0,95} = 110,6 \text{ A}$$

$$\Delta P_1 = R I^2 = 2,385 \cdot 110,6^2 = 0,0292 \text{ MW} \quad \Delta P_{\Sigma} = 3 \Delta P_1 = 0,0875 \text{ MW}$$